

## UNDESCRIBED SPECIES OF NEARCTIC TIPULIDAE (DIPTERA), XI

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ABSTRACT.— New species and subspecies of Tipulidae from California and Alaska are described, including *Tipula* (*Trichotipula*) *frommeri*, *Tipula* (*Trichotipula*) *sanctaecruzae*, and *Tipula* (*Lunatipula*) *hastingsae diperona*, from California, and *Tipula* (*Pterelachisus*) *macleani* and *Limnophila byersi* from Alaska.

The preceding paper in this series was published in the *Great Basin Naturalist* 29:1-10.

The species discussed at this time are derived from three sources: two from California, the third from Alaska. The first Californian series is from the California Channel Islands in the Channel Islands National Monument west of Los Angeles including Santa Cruz, San Miguel, and San Nicolas islands, the materials having been collected chiefly by Dr. Charles L. Remington, his son, Eric E. Remington, and L. Serge Matlovsky. The named materials are preserved in the Peabody Museum, Yale University, New Haven, Connecticut. The second Californian collection is from various canyons in and near Death Valley, Panamint Mountains, in Riverside and San Bernardino counties, chiefly in conjunction with the P. L. Boyd Deep Canyon Desert Research Center. The survey is under the direction of Dr. Saul I. Frommer, presently assisted by Messrs. Irwin and LePré. The materials are to be preserved in the University of California, Riverside, Research Collection. The Alaskan materials are from Dr. George W. Byers of the University of Kansas, Lawrence; the specimens having been taken by Stephen M. MacLean, made in conjunction with the United States Biome Tundra Program at Prudhoe Bay, Alaska. I express my sincere thanks to all of the above for the privilege of examining these particularly interesting species.

### *Tipula* (*Trichotipula*) *frommeri*, n. sp.

General coloration of thorax yellow, praescutal stripes bordered by pale brown, in cases the median area paler; legs yellow, tips of femora narrowly brown; wings weakly darkened, cell Sc and the stigma light brown, no trichia in outer wing cells; abdominal tergites conspicuously bicolored, bases broadly yellow, posterior borders brown, sternites and hypopygium more uniformly yellowed; male hypopygium with the beak of the inner dististyle long, with conspicuous setae.

MALE.— Length about 12 mm; wing 10 mm; antenna about 5.5 mm.

FEMALE.— Length about 13 mm; wing 11 mm; antenna about 2.5 mm.

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Described from alcoholic materials. Frontal prolongation of head slightly shorter than the remainder, yellow; nasus long and slender; palpi with proximal two segments brown, third slightly paler, terminal segment elongate, light yellow. Antennae of male elongate; scape and pedicel yellow, flagellum dark brown, flagellar segments with conspicuous basal enlargements, verticils shorter than the segments. Head brownish yellow.

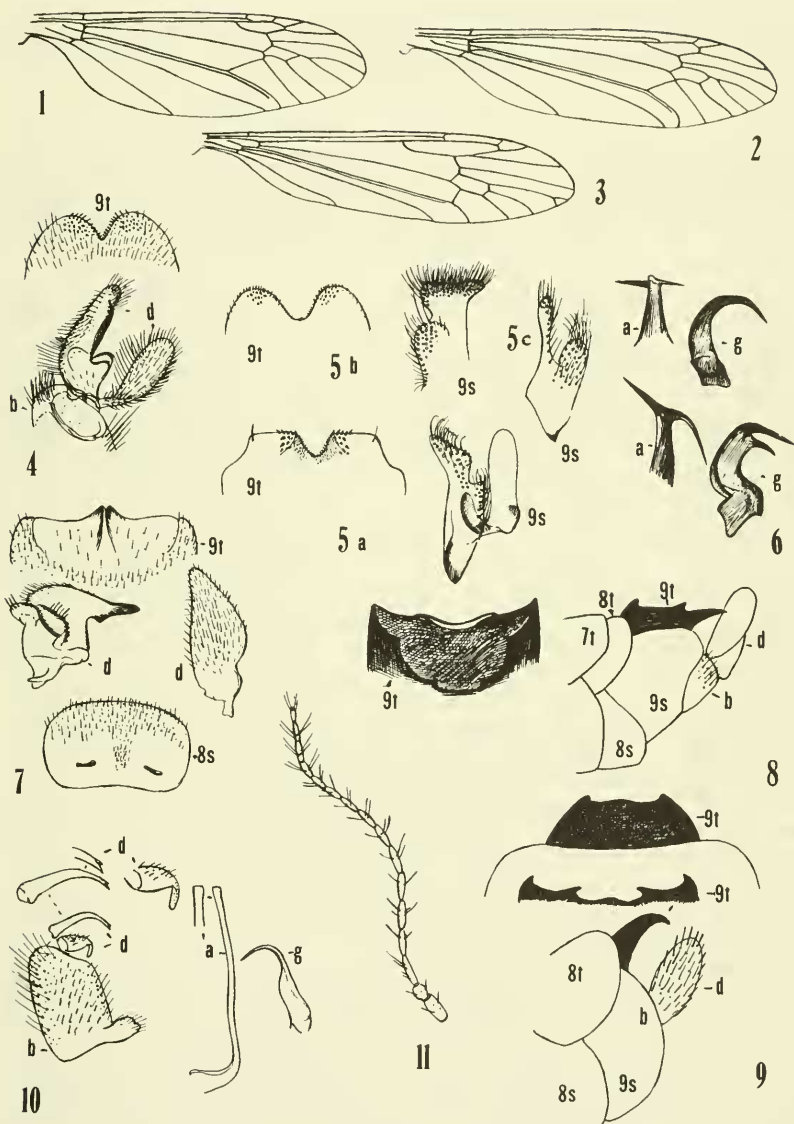
Pronotum yellow, center of scutum restrictedly darker. Mesonotal praescutum with four yellow stripes bordered by pale brown, in cases median area paler to produce a vague central stripe, as in *dorsolineata* and some others; scutal lobes yellow, ringed with pale brown; scutellum and postnotum brownish yellow, with erect setae. Pleura and pleurotergite yellowed, restrictedly darkened on cervical region, propleura, and pleurotergite. Halteres with stem yellow, knob infuscated. Legs with coxae and trochanters light yellow; femora yellow, appearing darker from abundant short darkened vestiture, tips narrowly brown; tibiae obscure yellow, tarsi passing into dark brown; claws small, simple. Wings (Fig. 1) weakly darkened, cell *Sc* and the stigma light brown; veins darker brown. Stigma with two or three microscopic trichia, outer cells without trichia. Venation: Petiole of cell  $M_1$  from about one-half to two-thirds  $m$ ;  $m-cu$  on  $M_4$ .

Abdominal tergites conspicuously bicolored, bases broadly yellow, posterior borders brown, on the proximal segments including also the narrow bases of the segments; sternites and hypopygium more uniformly yellow. Abdomen with conspicuous black setae. Male hypopygium (Fig. 4) with vestiture of tergal lobes,  $t$ , restricted in numbers, setae of emargination longer than a group of about 15 small blackened points near apex of each lobe. Basistyle,  $b$ , with a group of strong setae on outer margin of apex with more sparse longer bristles on inner side. Dististyles,  $d$ , as shown; outer style with very long black setae, longest exceeding transverse diameter of style; inner style with beak long, setae of base long and conspicuous, outer ones progressively shorter, apex of beak with numerous, very long, more delicate, yellow setae.

HABITAT.— California.

HOLOTYPE, ♂, alcoholic, P. L. Boyd Desert Research Center, Riverside County, Thunderbolt, Horsethief Creek, gaging station in first permanent pool, Malaise, 15 May 1970 (Saul I. Frommer). ALLOTOPOTYPE, ♀, Deep Canyon, 4 mi. south of Palm Desert, 5680 ft., 24 May 1969 (M. E. Irwin and Saul I. Frommer); 24-471. PARATOPOTYPE, ♂, in Alexander Collection, 3.5 mi. south of Palm Desert, at Marker 58, 15 May 1969 (Frommer and LaPré); 24-472.

This interesting fly is named for Dr. Saul I. Frommer, capable student of the Diptera, in charge of the Deep Canyon Research Project. By means of the author's key to the Californian species of the genus *Tipula* (Crane flies of California, pp. 56-57; 1967), the present fly runs to couplets 11 and 12, including three species in the subgenus *Trichotipula* that lack trichia in the outer wing cells, these



Figs. 1-3. Wing venation: 1, *Tipula* (*Trichotipula*) *frommeri*, n. sp.; 2, *Tipula* (*Pterelachisus*) *macleani*, n. sp.; 3, *Limnophila* *byersi*, n. sp. Figs. 4-10. Male hypopygia: 4, *Tipula* (*Trichotipula*) *frommeri*, n. sp.; 5a, *Tipula* (*Trichotipula*) *sanctaecruzae*, n. sp.; 5b, *Tipula* (*Trichotipula*) *capistrano* Alexander; 5c, *Tipula* (*Trichotipula*) *beatula* Osten Sacken; 6, above *Tipula* (*Lunatipula*) *hastingsae hastingsae* Alexander; 6, below, *Tipula* (*Lunatipula*) *hastingsae diperona*, n. subsp.; 7, *Tipula* (*Pterelachisus*) *macleani*, n. sp.; 8, *Tipula* (*Vestiplex*) *bergrothiana* Alexander; 9, *Tipula* (*Vestiplex*) *aldrichiana*; 10, *Limnophila* *byersi*, n. sp. Fig. 11. Male antenna of *Limnophila* *byersi*, n. sp. (Symbols: a, aedeagus; b, basistyle; d, dististyles; g, gonapophysis; s, sternite; t, tergite).

being *Tipula* (*Trichotipula*) *desertorum* Alexander, *T. (T.) dorso-lineata* Doane, and *T. (T.) kennedyana* Alexander, all differing evidently in hypopygial structure, especially the dististyles.

*Tipula* (*Trichotipula*) *sanctaecruzae*, n. sp.

Allied to *beatula* and *capistrano*; head and thorax patterned with dark brown and yellow, mesonotal mediotergite with a narrow yellow central line; male hypopygium with tergal lobes truncate; appendage of ninth sternite including a long outer lobe, the lateral lobe low.

MALE.— Length about 13 mm; wing 13.5 mm; antenna about 3 mm.

FEMALE.— Length about 14-15 mm; wing 13 mm.

Frontal prolongation of head blackened, narrowly yellow on sides, ventrally more reddish yellow; palpi black. Antennae with scape light brown, tip paler, remainder of organ black; flegellar segments elongate. Head orange on sides, central part of vertex and occiput brownish black.

Pronotum brownish black. Mesonotal praescutum on disk with four brownish gray stripes broadly bordered by black, lateral margins of praescutum light orange; scutal lobes dark brownish gray, with a narrow central polished black line, median region light yellow; scutellum light yellow with a narrow central black line, parascutella black; postnotal mediotergite brownish black with a narrow median yellow vitta on anterior half, in cases this less distinct, anapleurotergite yellowed, katapleurotergite with central part restrictedly yellowed. Pleura brownish gray, patterned with yellow, more evident in certain individuals, including the dorsal sternopleurite, pteropleurite, and dorsal meral region. Halteres with stem yellow, base narrowly orange, knob brownish black, apex restrictedly yellowed. Legs with coxae brownish gray, trochanters yellow; femora brownish yellow, apices dark brown; tibiae brownish yellow, tarsi passing into black. Wings generally as in *beatula* and *capistrano*, differing only in minor details.

Abdomen with segments conspicuously patterned with brownish black and yellow, on tergites the dark color including posterior border and a broad central stripe. Male hypopygium (Fig. 5a) with ninth tergite, *t*, having lobes truncate, spinoid setae small and sparse, as shown; median region bordering emargination with abundant microscopic setulae. Appendage of ninth sternite, *s*, shaped as shown, including a major outer lobe provided with numerous chiefly marginal long twisted yellow setae, lateral lobe low. In *beatula* (Fig. 5c) tergite generally similar, appendage of ninth sternite, *s*, distinctive, with a slender lateral lobe, as shown. In *capistrano* (Fig. 5b) tergal lobes, *t*, more rounded; appendage of ninth sternite, *s*, distinctive, obtuse, outer lobe with abundant, very conspicuous, long, yellow setae.

HABITAT.— California.



HOLOTYPE, ♂, Santa Cruz Island, Channel Islands,  $3\frac{2}{3}$  mi. to Devil's peak,  $\frac{2}{3}$  mi. to U.S.G.S. 1941, woodland, 4 April 1970 (Eric E. Remington). ALLOTOPOTYPE, ♀, 25 March 1970. PARATYPE, ♀, Santa Cruz Island, Cañada del Medio, at University of California Research Station, 18 April 1970 (Eric E. Remington).

The most similar species are *Tipula* (*Trichotipula*) *beatula* Osten Sacken and *T. (T.) capistrano* Alexander, all differing among themselves in hypopygial structure, especially the tergite and appendage of the ninth sternite, as discussed and figured.

In the California Bulletin concerning the crane flies, cited under the preceding species, there are only a few species recorded from the Channel Islands and several others were added in the collections made by the Remingtons, now preserved in the Peabody Museum. The determined species are here listed: *Nephrotoma wulpiana* (Bergroth), *Tipula* (*Bellardina*) *schizomera* Alexander, *Tipula* (*Triplitipula*) *occidentalis* Doane, *Tipula* (*Triplitipula*) *planicornis* Doane, *Tipula* (*Triplitipula*) *pubera* Loew, *Tipula* (*Yamatotipula*) *fulvilineata* Doane, *Limonia* (*Dicranomyia*) *defuncta concinna* (Williston), *Limonia* (*Idioglochina*) *marmorata* (Osten Sacken), and *Erioptera* (*Trimicra*) *pilipes* (Fabricius).

*Tipula* (*Lunatipula*) *hastingsae dipersona*, n. subsp.

MALE.— Length about 23 mm; wing 25 mm; antenna about 5 mm.

FEMALE.— Length about 23 mm; wing 20 mm.

General coloration much as in typical *hastingsae* Alexander (Bulletin Brooklyn Ent. Soc., 46:87-89; 1951), described from several stations in California, the detailed distribution being given in the Crane flies of California, as cited earlier, pages 43-44.

Size larger (male 25 mm; in *hastingsae*, 16-19 mm). Body and wing coloration generally similar in both subspecies. Chief differences found in the structure of the male hypopygium, especially the phallosome, as shown in the figures (*hastingsae*, Fig. 6 above; *dipersona*, Figure 6 below). Gonapophyses, *g*, in the present fly with a powerful lateral spine at near midlength, lacking in *hastingsae*; aedeagus, *a*, with posterior spine at apex of organ very long and slender.

HABITAT.— California.

HOLOTYPE, ♂, Santa Cruz Island, Channel Islands, at University of California Research Station, Cañada del Medio, 18 April 1970 (Eric E. Remington). ALLOTOPOTYPE, ♀, 15 April 1970; Alexander Collection.

*Tipula* (*Pterelachisus*) *macleani*, n. sp.

General coloration of head and thorax gray, praescutum medially patterned with darker; antennae uniformly black; legs with femora brownish yellow, tips narrowly black, claws toothed; wings subhyaline, restrictedly patterned with very pale brown; abdomen

dark brown, in cases tergites 2-4 reddened; male hypopygium with central outer portion of tergite depressed to form a shallow yellow saucer, posterior margin with two approximated triangular points; eighth sternite with posterior border truncate, with inconspicuous pale setae.

MALE.— Length about 12.5-13 mm; wing 12.5-13 mm; antenna about 4 mm.

FEMALE.— Length about 17 mm; wing 12.5 mm; antenna about 3.5 mm.

Frontal prolongation of head black, gray pruinose; nasus conspicuous, with a terminal tuft of light yellow setae; palpi black. Antennae black throughout, scape sparsely pruinose; flagellar segments with small basal enlargements, exceeding verticils in length. Head light gray; anterior vertex more elevated, low, slightly infuscated; dorsal setae short, black, genae with long light yellow setae.

Pronotal scutum gray, sides of scutellum light yellow. Mesonotal praescutum light gray, with two intermediate brown stripes that narrow strongly behind, separated by a vaguely differentiated ground vitta, lateral stripes very pale to scarcely evident; median part of transverse suture dark brown; posterior sclerites of notum clear light gray; scutum with a narrow impressed median line, lobes slightly variegated with very pale brown; scutellum light gray with a vague central darkening, parascutella darkened anteriorly, behind narrowly light yellow; postnotum uniformly clear light gray. Pleura light gray, dorsopleural membrane restrictedly obscure yellow. Halteres with stem obscure yellow, brighter basally, knob small, brown, apex obscure yellow. Legs with coxae and trochanters light gray; femora obscure brownish yellow, tips narrowly black; tibiae light brown, tarsi darker brown; claw with a small acute point at near midlength. Wings (Fig. 2) subhyaline, very restrictedly patterned with pale brown, oval stigma darker; outer two-thirds of cell *M* chiefly very pale brown, this with a whitened area at near midlength; veins brown. Trichia on certain veins beyond cord, lacking on most of  $R_{1+2}$ ,  $R_s$ ,  $M_4$  and *1st A* except at base, vein *2nd A* with extensive trichia. In paratype specimen, veins that comprise long cell *1st M*<sub>2</sub>, with the exception of  $M_{3+4}$ , very pale to subobsolete, in the holotype these elements normally darkened. Venation: Petiole of cell  $M_1$  about one-half *m*; distal section of  $Cu_1$  strongly recurved at outer end narrowing the cell.

Abdomen of holotype with basal segment and outer five tergites dark brown, their posterior borders very narrowly yellowed, tergites 2-4 reddened, grayish sublaterally; all sternites dark brownish gray, posterior borders very narrowly yellow. Paratype male with abdomen uniformly dark brown. Female with tergites 2-7 chiefly reddened, outer segments darkened, sternites as in the male, the extreme bases of intermediate segments yellowed. Ovipositor with cerci long, straight, very slender; hypovalvae stouter, proximal half blackened, apices rounded. Male hypopygium (Fig. 7) with ninth tergite, *t*, dark brown, posterior median portion slightly depressed to

form a flattened yellow saucer, margin produced into two low submedian triangular points; setae of tergite pale, on darkened parts from tiny yellow punctures, vestiture of saucer small and pale, very inconspicuous. Dististyles, *d*, as shown; beak of inner style long and slender, blackened. Eighth sternite, *8s*, with posterior border truncate, vestiture pale, discal setae small, sparse marginal bristles only slightly longer.

HABITAT.— Alaska.

HOLOTYPE, ♂, Prudhoe Bay, 70° 18' N. Lat., 148° 21' W. Long., altitude 15 m, 24 June 1971 (Stephen F. MacLean); Field Catalogue No. 162; University of Kansas Collection. ALLOTOPOTYPE, ♀, with the type, 13 July 1971; No. 338. PARATOPOTYPE, ♂, July 1971; No. 228; Alexander Collection.

The species is named for the collector, Stephen F. MacLean, of the United States Biome Tundra Program. In its general appearance, including the hypopygium, the fly suggests various regional species of the subgenus *Vestiplex* Bezzi, especially *Tipula* (*Vestiplex*) *bergrothiana* Alexander (Fig. 8) and *T.* (*V.*) *aldrichiana* Alexander (Fig. 9), both from Alaska. The drawings of the male hypopygia of these two flies are based on the type specimens preserved in the United States National Museum. Other less similar Arctic American species include *Tipula hewitti* Alexander, *T. johanseni* Alexander, and *T. subpolaris* Alexander, of the Canadian Northwest Territory, and *T. katmaiensis* Alexander. From the structure of the ovipositor it appears that the present fly is correctly placed in the subgenus *Pterelachisus* Rondani.

*Limnophila byersi*, n. sp.

General coloration of body brownish gray, head light gray, anterior vertex broad; antennae of male approximately one-third length of body; legs with femora yellow, tips brownish black, tarsi black; wings brownish yellow, stigma oval, dark brown; cell *R*<sub>2</sub> at margin slightly less than one-half cell *R*<sub>3</sub>; cell *M*<sub>1</sub> very small, from about one-fifth to one-sixth its petiole; male hypopygium with outer margin of basistyle with numerous very long setae, lobe of mesal face oval; outer dististyle narrowed on outer fourth, terminating in two small approximated points; phallosome with gonapophyses appearing as simple slender sickles, outwardly narrowed to an acute spine; aedeagus simple, long and slender, straight, nearly three times the apophyses.

MALE.— Length about 9 mm; wing 7.8 mm; antenna about 3.2 mm.

FEMALE.— Length about 12 mm; wing 9 mm.

Rostrum short and broad, transversely oval, dark brown, sparsely pruinose, with long whitish setae; palpi dark brown. Antennae of male (Fig. 11) long, nearly one-third the body; scape and pedicel dark brown, flagellum brownish black; flagellar segments with short dense pale setae and sparse longer bristles; intermediate fla-

gellar segments about 4-5 times as long as broad, verticils shorter than the segments; outer segments about three times as long as broad, subequal to their longest verticils; outer segment oval. Head light gray; anterior vertex very broad, about three times exposed diameter of eyes.

Pronotum brown, sparsely pruinose. Mesonotum almost uniformly brownish black, pruinose, praescutal stripes not differentiated; a single median black pit on praescutum, pseudosutural foveae larger, black; parascutella obscure yellow. Pleura gray; dorsopleural membrane obscure yellow. Halteres with stem yellow, knob small, weakly darkened. Legs with coxae and trochanters yellow; femora yellow, tips brownish black, on foreleg including about one-third the length, on posterior pair about one-fifth; tibiae brownish yellow, tips very narrowly darkened; tarsi black. Wings (Fig. 3) brownish yellow, base and costal region clearer yellow; stigma oval, dark brown; veins brown. Longitudinal veins beyond cord with black trichia, lacking on veins comprising cell *1st M*<sub>2</sub>; further trichia on *Rs*, outer third of basal section of *Cu*<sub>1</sub>, and on most of *2nd A*. Venation: cell *R*<sub>2</sub> at margin slightly less than one-half cell *R*<sub>3</sub>; cell *M*<sub>1</sub> very small, about one-fifth to one-sixth its petiole; *m-cu* shortly beyond one-third *M*<sub>3+4</sub>.

Abdomen brownish black, sparsely pruinose, including the hypopygium. Ovipositor with valves stout, cerci obscure yellow, hypovalvae black. Male hypopygium (Fig. 10) with basistyle, *b*, stout, outer margin thickened, with numerous very long setae, longest about one-half outer dististyle; cephalic end of mesal face with an oval lobe provided with long pale setae. Outer dististyle, *d*, glabrous, gently curved, outer fourth narrowed, terminating in two small approximated points, axial one stouter; inner style with base stout, with conspicuous setae, outer half narrowed, setae microscopic. Phallosome with gonapophyses, *g*, appearing as slender simple curved sickles, narrowed gradually into an acute spine; aedeagus simple, very long and slender.

HABITAT.— Alaska.

HOLOTYPE, ♂, Prudhoe Bay, 70° 18' N. Lat., 148° 21' W. Long., altitude 15 m, June 1971 (Stephen F. MacLean); No. 345. ALLOTOPOTYPE, ♀, with type; No. 298. PARATOPOTYPE, ♂, with types.

The species is named for my long time friend and fellow student of the Tipulidae, Dr. George W. Byers, of the University of Kansas. The closest regional ally is *Limnophila poetica* Osten Sacken, widely distributed in northern North America, from Massachusetts to British Columbia, thence north to Alaska. This is readily told from the present fly by the yellow body coloration, longer antennae, venation, especially the normal cell *M*<sub>1</sub>, and in details of the male hypopygium, including the basistyle, and the gonapophyses and aedeagus of the phallosome. The microscopically bidentate apex of the outer dististyle is found in both species.